(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 199660891 B2
(10) Patent No. 701705

(54) Title

Terminal block for high transmission rates

(51)[6] International Patent Classification(s)
H01R 009/26 H01R 004/24

(21) Application No: 199660891

(22) Application Date: 1996.08.02

(30) Priority Data

(31) Number	(32) Date	(33) Country
19537532	1995.09.29	DE

(43) Publication Date : 1997.04.10
(43) Publication Journal Date : 1997.04.10
(44) Accepted Journal Date : 1999.02.04

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(56) Related Art

US 5160273
US 4571014
EP 634817

AU9660891

(12) PATENT ABSTRACT (11) Document No. AU-A-60891/96
(19) AUSTRALIAN PATENT OFFICE

(54) Title
TERMINAL BLOCK FOR HIGH TRANSMISSION RATES

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H01R 009/26 **H01R 004/24**

(21) Application No. : **60891/96** (22) Application Date : **02/08/96**

(30) Priority Data

(31) Number	(32) Date	(33) Country
19537532	**29/09/95**	**DE GERMANY**

(43) Publication Date : **10/04/97**

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The present invention relates to a terminal block for high transmission rates in the telecommunication and data technique, comprising a plastic body with chambers disposed in at least one row for insulation displacement contact elements and slots for shield plates disposed in the transverse walls between said chambers and extending with parallel axes thereto.

The object of the invention, namely to provide a terminal block, wherein by the configuration of specially shaped shield plates an effective reduction of crosstalk and a substantial simplification of assembly of the shield pates and of the cable wires at the insulation displacement contact elements is guaranteed, is achieved by that chambers 2 of a terminal unit 26 are disposed in plastic body 1 at the lowest possible distance d to each other, and that slots 11, 25 for receiving the shield plates 16, 24 are provided from the lower side 23 in the transverse wall 9, 10, 27 between two adjacent terminal units 23 each, the distance d between the chambers 2 of a terminal unit 26 being appreciably smaller than the distance D between the chambers 2 of adjacent terminal units 26.

- Fig. 1 -

A B S T R A C T

The present invention relates to a terminal block for high transmission rates in the telecommunication and data technique, comprising a plastic body with chambers disposed in at least one row for insulation displacement contact elements and slots for shield plates disposed in the transverse walls between said chambers and extending with parallel axes thereto.

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- Fig. 1 -

AUSTRALIA

PATENTS ACT 1990

COMPLETE SPECIFICATION

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INVENTION TITLE:

Terminal block for high transmission rates

The following statement is a full description of this invention, including the best method of performing it known to me/us:–

The present invention relates to a terminal block for high transmission rates in the telecommunication and data technique, comprising a plastic body with chambers disposed in at least one row for insulation displacement contact elements and slots for shield plates disposed in the transverse walls between said chambers and extending with parallel axes thereto.

A terminal block of the type referred to hereinbefore is known in the art from US Patent 5,160,273. Herein it is intended to solve the problem of crosstalk through the cable wires connected to adjacent insulation displacement contact elements by insertion of a multitude of electrically conductive shield plates between the individual pairs of insulation displacement contact elements. The problem of crosstalk occurs at the transmission of large information volumes by electrical lines, the information being transmitted at high frequencies. The transmission at such high frequencies causes radiation and interference between adjacent cable wires, in particular when these cable wires are disposed closely adjacent to each other in the terminal block. By insertion of the electrically conductive shield plates a higher crosstalk attenuation at high frequencies is achieved.

The prior art terminal block comprises two parallel rows of chambers for insulation displacement contact elements, one shield plate each being assigned thereto and the opposite shield plates of the two rows being connected by a large-area connection plate being

inserted into the respective lower part of the terminal block. Application of large-area, electrically conductive shield plates requires however an increase of the constructional volume of the terminal blocks and higher costs for the manufacture of the terminal blocks.

In accordance with the invention, the chambers of a terminal unit are disposed in the plastic body at the lowest possible distance to each other, and that the slots for receiving the shield plates are provided from the lower side in the thicker transverse wall between two adjacent terminal units each. Thereby it is possible, by means of only two shield plates, to shield a pair of chambers forming a terminal unit and disposed at a small distance to each other in the plastic body. A larger distance between the chambers of adjacent terminal units reduces the risk of crosstalk.

In a preferred embodiment, the shield plates have in the upper section a latch opening cooperating with a latch lug in the plastic body when inserting the shield plate into the terminal block. The shield plates are inserted from the lower side into the terminal block. Further, the shield plates have in the area of the contact pin a cutout providing for a favourable cable guiding. The transmission properties are improved by a magnetic field structure favourably influenced by this measure. The shield plates are con-

nected to each other by the contact pins and a circuit track, for example on a printed circuit board.

The configuration of the cable wire introduction section of the insulation displacement contact element as provided in a preferred embodiment according to the invention permits an easier termination of cable wires by that the cable wires brought in place by hand are reliably attached by a tool prior to pressing-in by the knubs in the introduction section.

According to another embodiment, the shield plates of at least one chamber can be connected by narrow webs inserted in grooves in the bottom of the plastic body. This configuration of the shield plates allows a technically and economically less expensive installation of the shield plates immediately in the upper part of the terminal block, so that the configuration of the shield plates according to the invention is also possible for wire connectors comprising one row only of chambers for insulation displacement contact elements and having no lower part.

Further, three shield plates of two adjacent pairs of chambers can be connected to each other by narrow webs to form a shield plate cage. The three shield plates and the narrow webs connecting them form in the plane of the webs the shape of an eight consisting of seven short sheet-metal strips.

In a particularly preferred manner are disposed one slot each in the transverse wall between two pairs of closely adjacent chambers and two slots each in the transverse wall between two pairs each of closely adjacent chambers for receiving the shield plates. Hereby a particularly compact construction of in particular a wire connector is made possible.

By the pair-wise configuration of the chambers at a small distance to each other in a row of the plastic body, crosstalk attenuation of the insulation dis-

placement contact elements inserted in these chambers is further improved, the more since the distance of each pair of closely adjacent chambers of a terminal unit to the adjacent pair of another terminal unit is larger than the distance of closely adjacent chambers. Hereby the capacities of adjacent pairs of insulation displacement contact elements arranged in a row are further decreased, and the crosstalk properties are even further improved.

Embodiments of the invention provide a terminal block, wherein by the configuration of specially shaped shield plates an effective reduction of crosstalk and a substantial simplification of assembly of the shield plates and of the cable wires at the insulation displacement contact elements is guaranteed.

In the following, the invention will be described in more detail, with reference to embodiments of a terminal block for high transmission rates in the telecommunication and data technique represented in the drawings. There are:

Fig. 1 a perspective top view of the lower side of the terminal block comprising shield plates inserted in different stages,

Fig. 2 a side view of the terminal block of Fig. 1 with inserted shield plates,

Fig. 3 a top view of the lower side of the terminal block of Fig. 2,

Fig. 4 a sectional representation of the terminal block of Fig. 2 at the position of an inserted shield plate,

Fig. 5 the side view of a shield plate,

Fig. 6 the side view of an insulation displacement contact element,

Fig. 7 a partially sectional side view of a terminal block,

Fig. 8 a partially sectional front view of the terminal block of Fig. 7,

Fig. 9 a bottom view of the terminal block of Figs. 7, 8 with shield plate cages,

Fig. 10 a bottom view of a shield plate cage,

Fig. 11 a side view of the shield plate cage of Fig. 10, and

Fig. 12 a front view of the shield plate cage of Fig. 10.

According to the representation in Fig. 1, the terminal block is formed of a plastic body 1 comprising four terminal units 26 with two chambers 2 each disposed at a distance d. The chambers 2 are formed from the upper side 5 of the terminal block and serve for receiving insulation displacement contact elements 28. Each pair of chambers 2 of a terminal unit 26 is limited by a transverse wall 27, wherein a slot 25 is provided from the lower side 23 for the insertion of a shield plate 24 with a contact pin 32. The distance d between the chambers 2 of terminal unit 26 is substantially smaller than the distance D between the chambers 2 of adjacent terminal units 26. The distance D is at least 1.5 times the distance d. Each terminal unit 26 consists of a pair of chambers 2 comprising the insulation displacement contact elements 28 and a shield plate 24. The shield plate 24 shown on the left-hand side of Fig. 1 is only then necessary, when another terminal block is added. The terminal block can also be formed of plastic body assemblies separate for each terminal unit 26, said assemblies being combined to an arbitrary number of terminal units 26. The plastic bodies 1 can be lined up with the front sides 37 either smoothly or by latch elements.

In Fig. 2 is shown, in the side view of the terminal block, the position of the insulation displacement contact elements 28 in the plastic body 1 and the configuration of the individual terminal units 26 and the distances d between the chambers 2 of a terminal

unit 26 and to the adjacent terminal units 26. The insulation displacement contact elements 28 are accessible from the upper side 5 of the terminal block.

According to the representation of Fig. 6, the insulation displacement contact elements 28 have an introduction section 29 for not shown cable wires, said section being formed of opposite knubs 30 limiting a circular expanded portion 31 towards top. Thereby a cable wire inserted by hand into the expanded portion 31 is pre-fixed and can be pressed in without problems by a suitable tool into the clamping slot 6.

Fig. 3 shows, in a bottom view of the terminal block, the position of the contact pins 33 of the insulation displacement contact elements 28 and of the contact pins 32 of the shield plates 24 relative to each other and to the lower side 23 of the terminal block.

From Fig. 5 can be seen the configuration of the shield plates 24. The shield plates 24 have a latch opening 34 cooperating with respective latch lugs 35 in the upper section of the plastic body 1 (Fig. 4). In the area of the contact pin 32 is provided a cutout 36 in order to guarantee optimum wire guiding.

The position of the shield plates 24 in the plastic body 1 is shown in Fig. 4. It becomes apparent that the rest surface of the shield plate 24 is reduced. The contact pin 32 is formed offset relative to the longitudinal axis of the shield plate 24, so that there is sufficient space for the cutout 36.

In another embodiment according to Figs. 7 to 12, each chamber 2 comprises, as is shown in Fig. 7, a clamping slot 6 with lateral clamping webs 7 for clamping down the insulation of a cable wire, the conductor of which is pressed into the insulation displacement contact element 3 and is contacted in sol

derless, screwless and stripless manner with the insulation displacement contact element 3. On the lower side 23 of the plastic body 1 are formed fixing pins 8 made of plastic, said pins serving for attachment of the wire connector, for example on printed circuit boards.

As is shown in Figs. 7 and 9, the distance d between two immediately adjacent clamping slots 6 serving for the insertion of a pair of insulation displacement contact elements 6 is appreciably smaller than the distance D between the clamping slot 6 of the chamber 2 of the one pair and the clamping slot 6 of the chamber 2 of the adjacent pair. In the transverse wall 9 formed between two pairs of closely adjacent chambers 2 is provided from the lower side 21 a slot 11, and in the wider transverse wall 10 disposed between two groups of closely adjacent pairs are provided from the lower side 23 two slots 11 being connected on the lower side 23 in the bottom 12 of the wire connector by grooves 13, 14, 15, as it is shown in the bottom view in Fig. 9.

Into the slots 11 and grooves 12 to 14 of two adjacent pairs of chambers 2 or two adjacent groups of chambers 2, resp., is inserted a shield plate cage 15 as shown in Figs. 10 to 12. Said cage comprises three shield plates 16 inserted from the lower side 23 into the slots 11 between the pairs of adjacent chambers 2 in the plastic body 1, and further narrow webs 17, 18, 19 snap-fitted in the bottom grooves 12 to 14 of the plastic body 1, when the shield plates 16 are fully slid into the respective slots 11.

The three shield plates 16 and the narrow webs 17 to 19 connecting them have in the plane of the webs 17 to 19 the shape of an eight ormed of seven short sheet-metal strips, as is shown in Fig. 10. The respectively outside shield plates 16 in the diagonally

opposite corners 20 are each slightly bent off, as is shown in Fig. 10.

In order that the two shield plate cages 15 of the plastic body 1 of a wire connector shown in Figs. 7 to 9 fit, a slot 11 is formed in the transverse wall 9 between the two pairs of closely adjacent chambers 2, and two parallel slots 11 each are formed in the transverse wall 10 between two groups of pairs each of chambers 2 disposed closely side-by-side for receiving the shield plates 16 of the respective shield plate cage 15.

Each of the two shield plate cages 15 has in the central area of the plastic body 1 of the wire connector wherein two parallel slots 11 for two shield plates 16 are provided in the transverse wall 10, one earthing tapping portion 21 each on the lower side of the shield plates 16, as is shown in Figs. 7, 11 and 12. These are connected to a not shown earthing position of a not shown printed circuit board. The individual insulation displacement contact elements 3 have contact pins 22 projecting from the lower side for connection to the respective circuit tracks of the printed circuit board.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

L E G E N D

1	plastic body
2	chamber
3	insulation displacement contact element
4	cutout
5	upper side
6	clamping slot
7	clamping web
8	fixing pin
9	transverse wall
10	transverse wall
11	slot
12	groove
13	groove
14	groove
15	shield plate cage
16	shield plate
17	web
18	web
19	web
20	corner
21	earthing tapping portion
22	contact pin
23	lower side
24	shield plate
25	slot
26	terminal unit
27	transverse wall
28	insulation displacement contact element
29	introduction section
30	knub
31	expanded portion
32	contact pin
33	contact pin
34	latch opening
35	latch lug
36	cutout
37	front side

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A terminal block for high transmission rates in the telecommunication and data technique, comprising a plastic body with chambers disposed in at least one row for insulation displacement contact elements and slots for shield plates disposed in the transverse walls between said chambers and extending with parallel axes thereto, characterised in that chambers of a terminal unit are disposed in plastic body at the lowest possible distance (d) to each other, and that slots for receiving the shield plates are provided from the lower side in the transverse wall between two adjacent terminal units each, the distance (d) between the chambers of a terminal unit being appreciably smaller than the distance (D) between the chambers of adjacent terminal units.

2. A terminal block according to claim 1, characterised in that the shield plates are inserted from the lower side of the plastic body and latch therein by a latch opening with a latch lug in the plastic body and are connected to each other by a circuit track on a printed circuit board.

3. A terminal block according to claims 1 and 2, characterised in that the shield plates have in the area of the contact pin a cutout for cable guiding.

4. A terminal block according to claims 1 to 3, characterised in that in the chambers are inserted insulation displacement contact elements with a cable fixing portion in the introduction section.

5. A terminal block according to claim 1, characterised in that shield plates of at least one chamber are connected to each other by narrow webs inserted in grooves in the bottom of

plastic body.

6. A terminal block according to claim 1, characterised in that three shield plates of two adjacent pairs of chambers are connected to each other by narrow webs to form a shield plate cage.

7. A terminal block according to claim 6, characterised in that three shield plates and narrow webs connecting them form in the plane thereof the shape of an eight consisting of seven short sheet-metal strips (Fig. 10).

8. A terminal block according to claim 6, characterised in that one slot is disposed in transverse wall between two pairs of closely adjacent chambers, and two slots each are disposed in transverse wall between two pairs each of closely adjacent chambers for receiving shield plates.

9. A terminal block substantially as hereinbefore described with reference to the drawings.

DATED this 7th day of December, 1998

Krone Aktiengesellschaft

By DAVIES COLLISON CAVE
Patent Attorneys for the applicant

60891/96

FIG.1

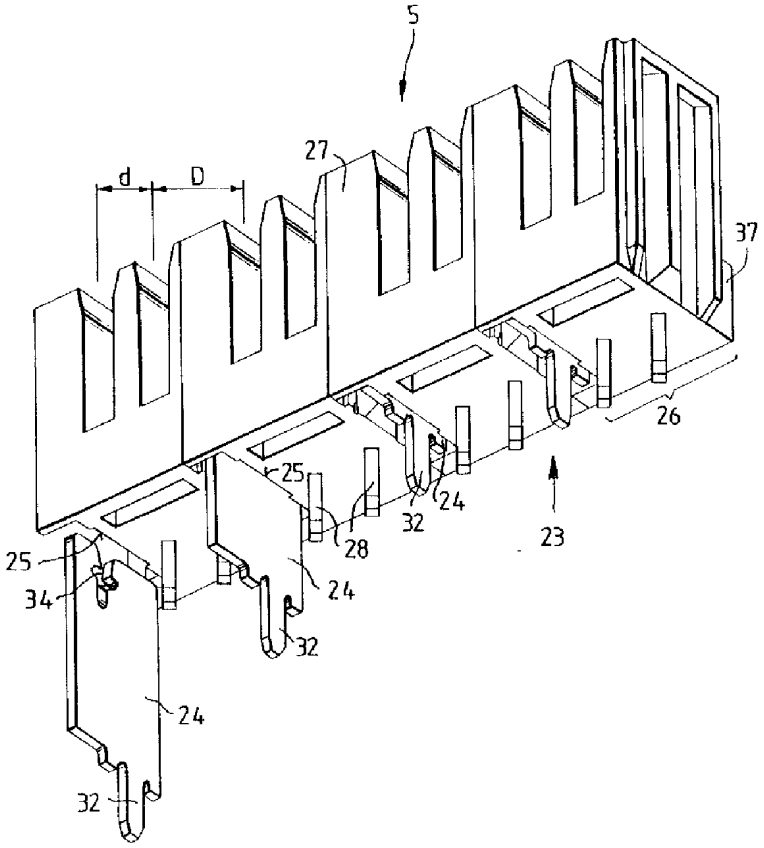

FIG.3

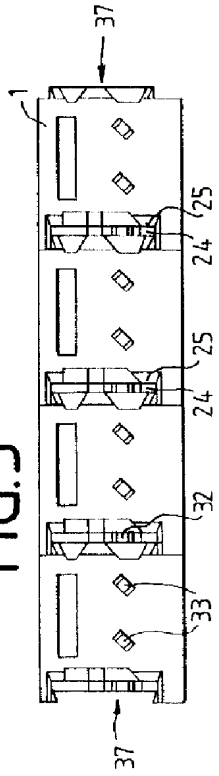

FIG.2

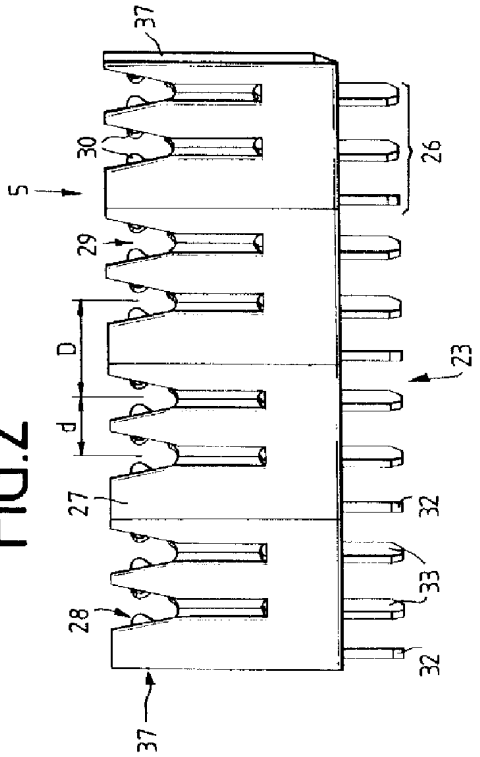

FIG.4

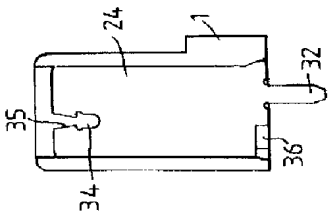

FIG.5

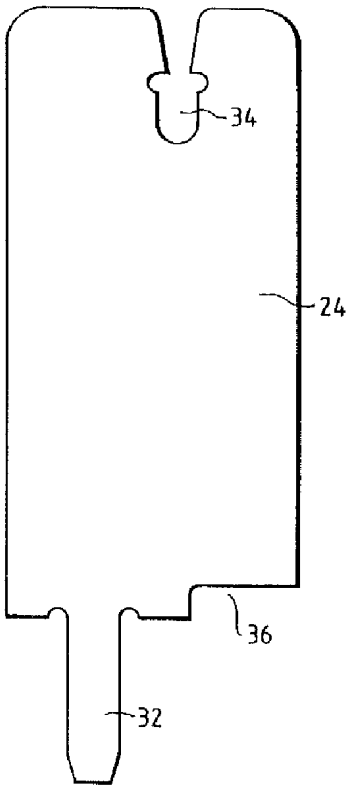

FIG.6

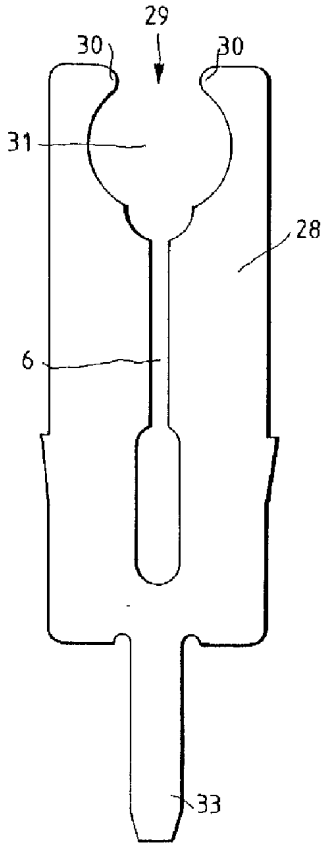

FIG.9

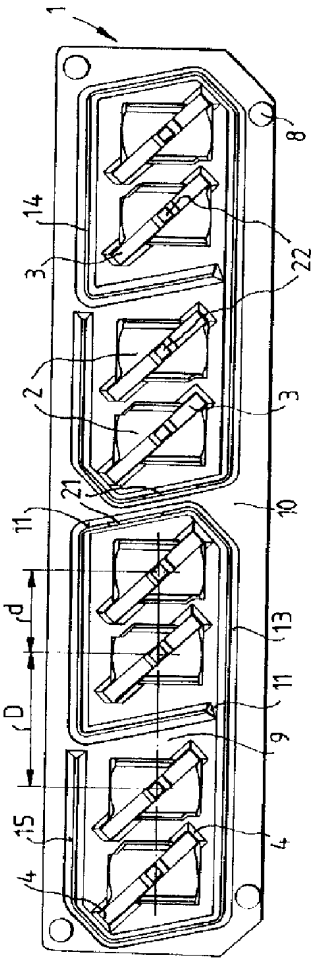

FIG.8

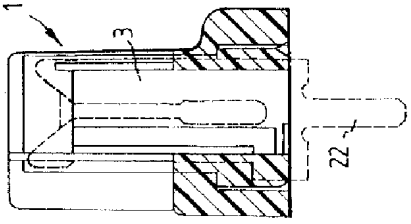

FIG.7

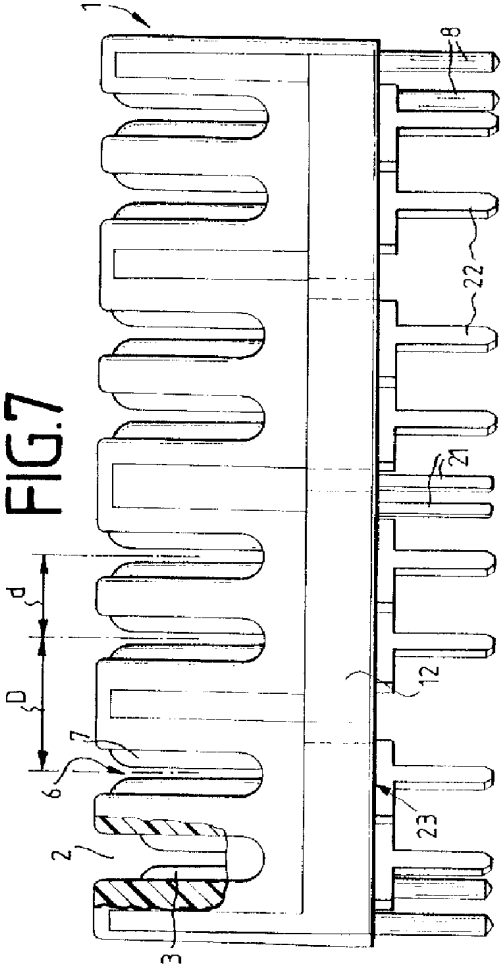

FIG.10

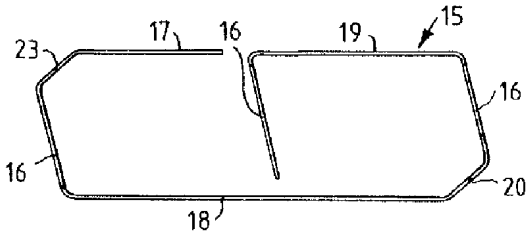

FIG.12

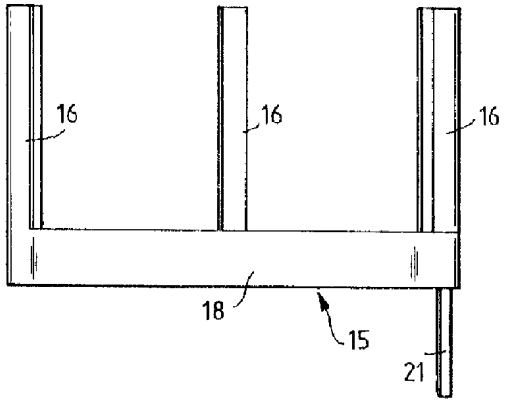

FIG.11